

Docket No. 2328-023RI

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PATENT

THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	
Inventor: Duane C. GATES	: Confirmation No. 9066
	:
U.S. Patent Application No. 09/534,814	: Group Art Unit: 3742
	:
Filed: March 22, 2000	: Examiner: MARK H. PASCHALL
For: SEGMENTED COIL FOR GENERATING PLASMA IN PLASMA PROCESSING EQUIPMENT	

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Attn: BOARD OF PATENT APPEALS AND INTERFERENCES

BRIEF ON APPEAL

Further to the Notice of Appeal filed March 28, 2008, in connection with the above-identified application on appeal, herewith is Appellant's Brief on Appeal. In view of the \$340 appeal fee paid in connection with the November 22, 2004 filing of Appellant's Brief, a credit card authorization form for \$170.00 is filed herewith.

To the extent necessary, Appellant hereby requests any required extension of time under 37 C.F.R. §1.136 and hereby authorizes the Commissioner to charge any required fees not otherwise provided for to Deposit Account No. 07-1337.

Adjustment date: 05/29/2008 HMARZI1  
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01 FC:1402 -340.00 DP

05/29/2008 HMARZI1 00000006 09534814  
01 FC:1402 510.00 DP

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Christina Frye 5/28/08  
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**I. Real Party in Interest**

The real party in interest is Lam Research Corporation, a California corporation that is a leading manufacturer of processors using plasma to assist in the formation of integrated circuits.

**II. Related Appeals and Interferences**

There are no pending related appeals and/or interferences, although a prior appeal brief was submitted November 22, 2004 and resulted in reopening of prosecution by the examiner.

**III. Status of Claims****A. Total Number of Claims in Application**

1. There are 58 claims in the application, identified as claims 1-58.

**B. Status of All the Claims**

1. Claims canceled: None
2. Claims withdrawn from consideration but not canceled: None
3. Claims pending: 1-58
4. Claims apparently allowed: 1-38; appellant states claims 1-38 are apparently allowed because there is no rejection thereof in the body of the final rejection and the office action summary of the final rejection does not indicate claims 1-38 are rejected.
5. Claims rejected: 39-58

**C. Claims on Appeal**

1. Claims on appeal: 39-58

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**IV. Status of Amendments**

All amendments have been entered. There was no amendment after the final rejection. Appellants submitted an amendment on April 17, 2006 in response to the nonfinal January 19, 2006 rejection. The next response by the PTO was a final rejection almost two years later, on January 31, 2007.

**V. Summary of Claimed Subject Matter**

Independent claim 39 relates to a low pressure plasma processor (Figure 6) for treating a workpiece W with a plasma. The processor includes a low pressure chamber 10 (page 1, lines 11, 12; page 1, lines 34, 39; page 3, lines 3-5) having a workpiece holder 40 for carrying workpiece W that is adapted to be affected by the plasma (page 1, line 38). The chamber has an inlet (indicated on the left side of Figure 6) for introducing into the chamber a gas which can be converted into the plasma for treating the workpiece (page 1, lines 33, 34). Coil 50 (Figures 4, 5 and 6) is positioned to couple an RF field to the gas for exciting the gas to the plasma state (page 3, lines 49-51; page 1, line 24). Coil 50 (Figure 4 or 5) includes interior portion 52, peripheral portion 54, and an intermediate portion, in the form of a straight lead that is between and connects the interior and peripheral portions to each other (page 4, line 59-page 5, line 2). The interior, intermediate and peripheral portions have turns (Figure 4 or 5) connected to each other and arranged so the magnetic flux density coupled to the plasma by each of the interior and peripheral coil portions exceeds the magnetic flux density coupled to the plasma by the intermediate coil portion (inherent, as indicated by paragraph 3 of Patrick Declaration, Exhibit 2).

Independent claim 45 concerns a coil 50 (Figure 4 or 5) for use with a low pressure plasma processor (Figure 6; page 3, lines 3-5) for treating a workpiece W with an RF plasma (page 1, lines 11, 12). The processor includes a low pressure chamber 10 (page 1, lines 34, 39; page 3, lines 3-5) including a workpiece holder 40 for carrying a

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workpiece W that is adapted to be affected by the plasma (page 1, line 38). The chamber has an inlet (indicated on the left side of Figure 6) for introducing into the chamber a gas which can be converted into the RF plasma for treating the workpiece (page 1, lines 33, 34). The coil 50 is adapted to be positioned to couple an RF field to the gas for exciting the gas to the plasma state (page 3, lines 49-51; page 1, line 24). The coil 50 comprises an interior portion 52, peripheral portion 54 and an immediate portion, in the form of a straight lead that is between and connects the interior and peripheral portions (page 4, line 59-page 5, line 2). The interior, intermediate and peripheral portions have turns (Figure 4 or 5) connected to each other and arranged so the magnetic flux density coupled to the plasma by each of the interior and peripheral coil portions exceeds the magnetic flux density coupled to the plasma by the intermediate coil portion (inherent, as indicated by paragraph 3 of Patrick Declaration, Exhibit 2).

Independent claim 51 is directed to a coil 50 (Figures 3-6) for use with a low pressure plasma processor (Figure 6; page 3, lines 3-5) for treating a workpiece W with an RF plasma. The processor includes a low pressure chamber 10 having a workpiece holder 40 for carrying a workpiece W adapted to be treated by plasma in the chamber (page 1, line 38). The chamber 10 has an inlet (indicated on the left side of Figure 6) for introducing into the chamber a gas which can be converted into the RF plasma for treating the workpiece (page 1, lines 33, 34). As illustrated in Figure 6, coil 50 is adapted to be positioned outside chamber 10 to couple, through the window indicated by the plate having solid and dashed lines (Figure 6; page 5, line 10) an RF field to the gas for exciting the gas to the plasma state (page 3, lines 49-51; page 1, line 24). The coil 50 has an interior portion 52, a peripheral portion 54 and an intermediate portion (page 4, line 59-page 5, line 2). As illustrated in Figures 3-5, interior portion 52 has plural radially and circumferentially extending turns and exterior portion 54 has at least one circumferentially extending turn. As illustrated in Figures 3-5, the intermediate portion is configured so it (a) does not include a complete turn, (b) is substantially less than a complete turn, and (c) includes a lead connected to ends of the turns of the interior and exterior portions. Figures 4 and 5 indicate the lead has at least a portion that is straight.

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Independent claim 54 defines a low pressure plasma processor (Figure 6) for treating a workpiece W with plasma. The processor comprises a low pressure chamber 10 (page 1, lines 11, 12; page 1, lines 34, 39) where the workpiece W is adapted to be located. The chamber 10 has an inlet (indicated on the left side of Figure 6) for introducing into the chamber a gas which can be converted into the plasma for treating the workpiece (page 1, lines 33, 34). Coil 50 (Figures 3-6) is positioned to couple an RF field to the gas for exciting the gas to the plasma state (page 3, lines 49-51; page 1, line 24). Coil 50 includes an interior portion 52, a peripheral portion 54 and an intermediate portion. As illustrated in Figures 3-5, interior portion 52 includes plural radially and circumferentially extending turns and the exterior segment 54 has at least one circumferentially extending turn. As illustrated in Figures 3-5, the intermediate portion is configured so it (a) does not include a complete turn, (b) is substantially less than a complete turn, and (c) includes a lead connected to ends of the turns of the interior and exterior portions. The lead has at least a portion that is straight.

#### **VI. Grounds of Rejection to be Reviewed on Appeal**

A. The rejection of claims 39-58 under 35 USC 251 as being based upon new matter added to the patent for which reissue is sought.

B. The rejection of claims 39-58 under 35 USC 112, first paragraph, as failing to comply with the written description requirement.

C. The rejection of claims 39 and 45 under 35 USC 103(a) as being unpatentable over Bignell, US patent 3,586,905.



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## **VII. Argument**

### **A. The allegations on page 2 of the final rejection do not track with the claims as most recently presented to the PTO**

Page 2 of the final rejection alleges new matter is found in independent claim 39, lines 7-13, independent claim 45, lines 10-16, independent claim 51, lines 10-17, and independent claim 54, lines 8-15, because these claims describe a coil having interior, intermediate and peripheral portions and different magnetic fluxes for these different coil portions. The most recent version of the submitted claims in PAIR and according to appellant's records indicates claim 39 has 9 lines, claim 45 has 10 lines, claim 51 has 12 lines, and claim 54 has 10 lines. Consequently, the allegations on page 2 of the final rejection are inconsistent with the record.

In addition, the allegation that claims 51 and 54 describe different magnetic fluxes for different coil portions is incorrect. There is no mention of magnetic fluxes in either claim 51 or 54.

### **B. The rejections of independent claims 39 and 45 based on new matter under 35 USC 251, and under 35 USC 112, first paragraph, as failing to comply with the written description requirement, are contrary to a prior holding by the Patent and Trademark Office.**

Prior to the present reissue application being filed, a claim virtually identical to claim 39 was submitted in the commonly assigned Holland et al. U.S. Application Serial No. 08/931,503. Claim 45 of the present application is a same as claim 39, except that claim 45 is directed to a coil for use with a low pressure plasma processor, rather than to a low pressure plasma processor per se. As such, claim 45 refers to interior, intermediate and peripheral portions and magnetic flux density in the same manner as claim 39.

The claim of the Holland et al. application was as follows:

A low pressure plasma processor for treating a workpiece with a plasma comprising a low pressure chamber where the workpiece is adapted to be located, the chamber having an

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inlet for introducing into the chamber a gas which can be converted into the plasma for treating the workpiece, a coil positioned to couple an RF field to the gas for exciting the gas to the plasma state, the coil including interior, intermediate and peripheral portions, the interior and peripheral portions having turns connected to each other and arranged so the magnetic flux density coupled to the plasma by each of the interior and peripheral coil portions exceeds the magnetic flux density coupled to the plasma by the intermediate coil portion.

The only differences between claim 39 of the present application and the rejected claim of the Holland et al. application are the addition, for clarity, of the word "intermediate," and the requirement for the chamber to include a workpiece holder, as set forth below:

A low pressure plasma processor for treating a workpiece with a plasma comprising a low pressure chamber ~~where the~~ including a workpiece is adapted to be located holder for carrying a workpiece that is adapted to be affected by the ~~plasma~~, the chamber having an inlet for introducing into the chamber a gas which can be converted into the plasma for treating the workpiece, a coil positioned to couple an RF field to the gas for exciting the gas to the plasma state, the coil including interior, intermediate and peripheral portions, the interior, intermediate and peripheral portions having turns connected to each other and arranged so the magnetic flux density coupled to the plasma by each of the interior and peripheral coil portions exceeds the magnetic flux density coupled to the plasma by the intermediate coil portion.

The claim of the Holland et al. application was rejected in a November 8, 2002 Office Action (of record in this file and Exhibit 1 attached to this Brief) as being anticipated by the disclosure in the original Gates patent. The Office Action includes the following statement:

The Gates reference discloses in figure 6: a vacuum processor with a chamber 10 and workpiece W; a gas inlet as shown; a matching network (see col. 5, line 1). Figure 5 shows a coil 50 with outer peripheral winding 54 and inner central winding 52 with an intermediate portion therebetween. The current inherently develops a magnetic

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flux density coupled to the plasma greater by the windings 52 and 54 than the connecting portion because there are more windings at the central and peripheral portions in order to yield a uniform plasma (see col. 3, lines 49-52).

The examiner who handled the Holland et al. application ruled that the Gates patent inherently included all the requirements of the Holland et al. claims. In making such a ruling, the examiner who handled the Holland et al. application ruled the magnetic flux that is coupled to the plasma by each of the interior and peripheral coil portions of the Gates patent has a density that exceeded the density of the magnetic flux coupled to the plasma by the intermediate coil portion of the original Gates patent. As a result of the position set forth in the office action in the Holland et al. application, the present reissue application was filed.

The examiner in the present case has not given any faith or credit to the position of the examiner who handled the Holland et al. application. The examiner in the present case says there is no basis in the present application for the features inherently found in the disclosure of the present case by the examiner who handled the Holland et al. application. The examiner in the present application has provided no satisfactory rationale to rebut the inherency position set forth by the examiner who handled the Holland et al. application. The position of the examiner of the present application is that the previous position of the Patent and Trademark Office has no effect on his decision and is not controlling. The examiner handling the present application has not set forth rationale to refute the previous position of the PTO regarding the equivalency between the requirements of claim 39 of the present application, as it now stands, *vis a vis*, the rejected claim of the Holland et al. application.

Examiners of the Patent and Trademark Office act on behalf of the Commissioner of Patents. As such, the action of one examiner, when considering the issue of inherency, should be binding on the Office, as a whole, unless evidence or rationale exists to show that the original PTO position was incorrect. In the present case, no such evidence or rationale has been forthcoming. There is nothing in the

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record to refute the original position of the PTO that the claim in the Holland et al. application is inherent in the disclosure of the present application.

**C. There is an adequate written description of the subject matter of independent claims 39, 45, 51 and 54 and these claims do not contain new matter.**

It is well established that a disclosure of a device that inherently performs a function or has a property or that operates according to a theory necessarily discloses that function or theory, even though the application says nothing explicit concerning the function, property or theory. *In re Reynolds*, 443 F.2d 384, 170 USPQ 94 (CCPA 1971); *In re Smythe*, 480 F.2d 1376, 178 USPQ 279 (CCPA 1973). It is also well established that information contained in the drawings may be added to the claims. *Vas-Cath*, 935 F.2d, 15555, 1565, 19 USPQ2d, 1111, 118; *In re Wolfensperger*, 302 F.2d 950, 133 USPQ 537 (CCPA 1962); *Autogiro Co. of America v. United States*, 384 F.2d 391, 398, 155 USPQ 697, 703 (Ct. Cl. 1967).

The examiner has not met the requirement of showing why Dr. Patrick's Declaration that provides rationale for inherency is incorrect, as required by *In re Alton*, 76 F.3d 1168, 1176, 37 USPQ2d 1578, 1584 (Fed. Cir. 1996).

Based on the foregoing principles, independent claims 39, 45, 51 and 54 have a clear basis from the written description of the application as filed.

1. Claims 39 and 45 do not constitute new matter and comply with the written description requirement

The low pressure plasma processor of claim 39 and the coil for such a processor, as defined by claim 45, can be read on the disclosure of the present application as follows:

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a low pressure plasma processor for treating a workpiece with a plasma	Page 1, lines 8-12.
a low pressure chamber having a workpiece holder for carrying a workpiece that is adapted to be affected by the plasma	Page 1, lines 11, 12, 34 and 39; Page 3, lines 3-5; Figs. 1 and 6; chamber 10 and workpiece holder 40 for carrying workpiece W
the chamber having an inlet for introducing into the chamber a gas which can be converted into the plasma for treating the workpiece	Page 1, lines 34-39; Figs. 1 and 6
a coil positioned to couple an RF field to the gas for exciting the gas of the plasma state	Page 1, lines 19-27; Page 2, lines 28-33; Page 3, lines 42-45; lines 53-55; Page 4, lines 21, 22, lines 36, 37, lines 59, 60; coil 50, Figs. 3-6
the coil including interior, intermediate and peripheral portions	Page 3, lines 53-62; coil 50 includes inner coil portion 52, an outer coil portion 54; Fig. 3-6; Figs. 3-4 clearly indicate there is an intermediate portion of coil 50 between portions 52 and 54; also see paragraph 3, sections (1), (2), (4), (7) and (9) of Dr. Patrick's Declaration
the interior, intermediate and peripheral portions having turns connected to each other and arranged so the magnetic flux density coupled to the plasma by each of the interior and coil portions exceeds the magnetic flux density coupled to the plasma by the intermediate core portion.	Because the plural turns of interior portion 52 of coil 50 are connected in series with the plural turns of exterior portion 54 of the coil by intermediate coil portion when switch S1 (Fig. 4) is open and when switch S2 (Fig. 5) connects the outer end of coil portion S2 to the inner end of coil portion S4 and the intermediate coil portion between portions 52 and 54 is a straight lead, this requirement is inherently provided by appellant's structure; see paragraph 3, sections (1), (2), (3), (4), (5), (6), and (7) of Dr. Patrick's Declaration

2. Claims 51 and 54 do not constitute new matter and comply with the written description requirement

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The low pressure plasma processor of claim 54 reads on the disclosure of the present application as follows:

Claim limitations	Basis
a low pressure plasma processor for treating a workpiece with a plasma	Page 1, lines 8-12.
a low pressure chamber where the workpiece is adapted to be located	Page 1, lines 11, 12, 34 and 39; page 3 Figs. 1 and 6; chamber 10
the chamber having an inlet for introducing into the chamber a gas which can be converted into the plasma for treating the workpiece	Page 1, lines 34-39; Figs. 1 and 6
a coil positioned to couple an RF field to the gas for exciting the gas plasma state	Page 1, lines 19-27; page 2, lines 28-33; page 3, lines 42-45; lines 53-55; page 4, lines 21, 22, lines 36, 37, lines 59, 60; coil 50, Figs. 3-6
the coil including interior, intermediate and peripheral portions	Page 3, lines 53-62; coil 50 includes inner coil portion 52, outer coil portion 54; Fig. 3-6; Figs. 3-4 clearly indicate there is an intermediate portion of coil 50 between portions 52 and 54; also see paragraph 3, sections (1), (2), (4), (7) and (9) of Dr. Patrick's Declaration
the interior portion including plural radially and circumferentially extending turns	Page 2, lines 39-42; page 3, lines 57, 58; Figs. 3-5 indicate coil portion 52 has about 2 ½ turns
the exterior portion having at least one circumferentially extending turn	Page 2, lines 39-42; page 3, lines 57, 58; Figs. 3-5 indicate exterior coil portion 54 has more than 2 turns
the intermediate portion being configured so it (a) does not include a complete turn, (b) is substantially less than a complete turn, and (c) includes a lead connected to ends of the turns of the interior and exterior portions, the lead having at least a portion that is straight	Figs. 3, 4 and 6 indicate the intermediate portion of coil 50, connected between portions 52 and 54, does not include a complete turn, is substantially less than a complete turn, and includes a lead with a straight portion. The same is true in Fig. 5 when switch 52 is activated to connect the exterior of portion 54 to the interior of portion 52.

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The coil of claim 51 includes all the foregoing coil requirements of claim 54.

3. The allegations that dependent claims 40, 46-50 and 56 add new matter and/or do not comply with the written description requirement of 35 USC 112, first paragraph, are wrong.

The requirements of claims 40 and 46, which respectively depend on claims 39 and 45, read on the disclosure as follows:

the interior portion includes plural radially and circumferentially extending turns	Page 2, lines 39-42; page 3, lines 57, 58; Figs. 3-5 indicate coil portion 52 has about 2 ½ turns; see paragraph 3, section (8) of Dr. Patrick's Declaration
the exterior portion having at least one circumferentially extending turn	Page 2, lines 39-42; page 3, lines 57, 58; Figs. 3-5 indicate exterior coil portion 54 has more than 2 turns; see paragraph 3, section (8) of Dr. Patrick's Declaration
the intermediate portion being configured so it (a) does not include a complete turn, (b) is substantially less than a complete turn, and (c) includes a lead connected to ends of the turns of the interior and exterior portions.	Figs. 3, 4 and 6 indicate the intermediate, straight lead portion of coil 50, connected between portions 52 and 54, does not include a complete turn and is substantially less than a complete turn. The same is true of Fig. 5 when switch 52 is activated to connect the exterior of portion 54 to the interior of portion 52. See paragraph 3, section (9) of Dr. Patrick's Declaration.

The requirement of claim 47 for the interior and exterior portions to be connected in series is found at page 3, lines 57-61; page 4, lines 27-29; page 4, lines 41-44; page 2, lines 24-26. When switch S1 of Fig. 4 is open and switch S2 of Fig. 5 connects portions 52 and 54 in series, the requirement of claim 47 for the intermediate portion to be connected in series with the interior and exterior portions is satisfied. Also see paragraph 3, sections (1) and (8) of Dr. Patrick's Declaration. The further requirement of claim 47 for the interior and exterior portions to respectively include terminals for connection to a source of RF can be found at page 3, lines 62-64, which states:

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The coil 50 includes a first inner coil portion 52 and a second outer coil portion 54. An inner tap labeled (+), and an outer tap, i.e. terminal, labeled (-) are provided to facilitate connection to the RF circuitry.

This statement, made in connection with Figure 3, is equally applicable to Figures 4-6. The description of Fig. 6 (page. 4, line 59-page 5, line 2) indicates one terminal of RF source 30 is coupled via cable 32 through impedance matching circuitry including loop 34 and coil 36, as well as a tuning capacitor, to the (+) terminal at the interior of interior coil portion 52 and a second terminal of the RF source is coupled to the (-) terminal at the outside of peripheral portion 54 of coil 50.

The requirement of claim 49 for the interior portion to include plural spiral like turns is apparent from an inspection of peripheral portion 52 of coil 50 of each of Figures 3-5.

The requirement of claims 50 and 56 for the exterior portion to include plural spiral-like turns is apparent from an inspection of peripheral portion 54 of coil 50 of each of Figures 3-5.

**D. Appellants' response to statements set forth in the paragraph bridging pages 4 and 5 of the final rejection.**

The final rejection states that Dr. Patrick's Declaration has been given proper weight and addressed in prior office actions. Appellant's review of the file fails to find an adequate discussion of why Dr. Patrick's Declaration is not applicable.

Page 5 of the final rejection states appellant has the duty to point out the line and page where all words of the claim are set forth. This is not the law in the United States. Instead, as discussed at the beginning of this argument, inherent features and features disclosed by the drawing can be relied on as a basis for the written description requirement of the claims. This Brief and the Declaration of Dr. Patrick clearly indicate how the coil has three individual portions, as set forth in independent claims 39, 45, 51 and 54. The description need not be in *ipsis verbis* (i.e., in the same words) to be sufficient. *Martin v. Johnson*, 454 F.2d 746, 751; 172 USPQ 391, 395



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(CCPA 1972). Hence, appellant need not point out the line and page where the claim requirements are found since he has shown how the claim requirements are found in the drawing and are inherent.

Page 5 of the final rejection states appellant should note that the coil specifics, such as the planar relation of one turn of the coil to another and the spatial and planar locations of one coil portion to another, have not been disclosed. Firstly, most of this statement is irrelevant to the claims at issue because the claims do not mention planar relations of one turn of the coil to another. Further, the application as filed does indicate, at page 5, line 5, that the coils can be coplanar and the drawings clearly indicate the spatial locations of the coil portions, as Dr. Patrick has testified.

**E. Bignell does not render independent claims 39 and 45 obvious under 35 USC 103(a)**

Claims 39 and 45 differ from Bignell by requiring a low-pressure chamber including a workpiece holder for carrying a workpiece that is adapted to be affected by a plasma of a low-pressure plasma processor. Page 4 of the final rejection admits claims 39 and 45 differ from Bignell by requiring a work holder, but fails to consider the requirements of the claim for a low-pressure chamber. The office action incorrectly implies one of ordinary skill in the art would have modified Bignell to include a work holder.

Bignell is concerned with a plasma arc gas heating apparatus. Column 8, lines 21-26 indicates the Bignell device is used, for example, in vapor phase production of titanium pigments for preheating oxygen gas required for reaction with titanium tetrachloride to temperatures such as to effect such reaction and thereby produce a titanium dioxide pigment. Column 3, line 72 -column 4, line 10 indicates gas under pressure is introduced into gas chamber 25 from whence the gas under pressure is sprayed into the interior of tubular member 26 by spray nozzles 32, 33 and gas under pressure is supplied to the interior of tubular member 26 through auxiliary inlet connection.

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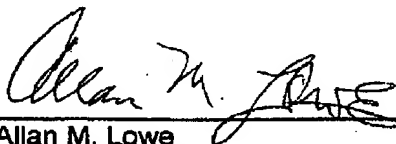
A plasma arc gas heating apparatus of the type disclosed by Bignell is entirely different from a low-pressure chamber including a workpiece holder for carrying a workpiece that is adapted to be affected by a plasma. There is no disclosure in Bignell of a low-pressure chamber, nor is it all apparent as to how the Bignell plasma arc gas heating apparatus that is employed for preheating oxygen gas would be used to process a workpiece in a low-pressure chamber of a low-pressure plasma processor. Because of the difference in kind of the processor and coil defined by claims 39 and 45 relative to the apparatus Bignell discloses, one of ordinary skill in the art would not have considered the Bignell apparatus in connection with that of claims 39 and 45. Further, the office action provides no rationale as to why one of ordinary skill in the art would have modified Bignell to arrive at the structure of claim 39 and/or 45. Consequently, the rejection of claims 39 and 45 under 35 USC 103(a) is incorrect.

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Reversal of the rejection is in order.

Respectfully submitted,

By:



Allan M. Lowe  
Reg. No. 19,641

1700 Diagonal Road, Suite 300  
Alexandria, Virginia 22314  
(703) 684-1111  
(703) 518-5499 Facsimile  
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PATENT**VIII. Claims Appendix**

39. A low pressure plasma processor for treating a workpiece with a plasma comprising a low pressure chamber including a workpiece holder for carrying a workpiece that is adapted to be affected by the plasma, the chamber having an inlet for introducing into the chamber a gas which can be converted into the plasma for treating the workpiece, a coil positioned to couple an RF field to the gas for exciting the gas to the plasma state, the coil including interior, intermediate and peripheral portions, the interior, intermediate and peripheral portions having turns connected to each other and arranged so the magnetic flux density coupled to the plasma by each of the interior and peripheral coil portions exceeds the magnetic flux density coupled to the plasma by the intermediate coil portion.

40. The processor of claim 39 wherein the interior portion includes plural radially and circumferentially extending turns, the exterior segment having at least one circumferentially extending turn, the intermediate portion being configured so it (a) does not include a complete turn, (b) is substantially less than a complete turn, and (c) includes a lead connected to ends of the turns of the interior and exterior portions.

41. The processor of claim 40 wherein the interior, intermediate and exterior portions are connected in series, the interior and exterior portions respectively including terminals for connection to a source of RF.

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42. The processor of claim 40 wherein the exterior portion includes plural radially and circumferentially extending turns.

43. The processor of claim 40 wherein the interior portion includes plural spiral like turns.

44. The processor of claim 43 wherein the exterior portion includes plural spiral like turns.

45. A coil for use with a low pressure plasma processor for treating a workpiece with an RF plasma wherein the processor includes a low pressure chamber including a workpiece holder for carrying a workpiece that is adapted to be affected by the plasma, the chamber having an inlet for introducing into the chamber a gas which can be converted into the RF plasma for treating the workpiece, the coil being adapted to be positioned to couple an RF field to the gas for exciting the gas to the plasma state, the coil comprising: interior, intermediate and peripheral portions, the interior, intermediate and peripheral portions having turns connected to each other and arranged so the magnetic flux density coupled to the plasma by each of the interior and peripheral coil portions exceeds the magnetic flux density coupled to the plasma by the intermediate coil portion.

Serial No. 09/534,814

46. The coil of claim 45 wherein the interior portion includes plural radially and circumferentially extending turns, the exterior portion having at least one circumferentially extending turn, the intermediate portion being configured so it (a) does not include a complete turn, (b) is substantially less than a complete turn, and (c) includes a lead connected to ends of the turns of the interior and exterior portions.

47. The coil of claim 46 wherein the interior, intermediate and exterior portions are connected in series, the interior and exterior portions respectively including terminals for connection to a source of RF.

48. The coil of claim 46 wherein the exterior portion includes plural radially and circumferentially extending turns.

49. The coil of claim 46 wherein the interior portion includes plural spiral like turns.

50. The coil of claim 49 wherein the exterior portion includes plural spiral like turns.

Serial No. 09/534,814

51. A coil for use with a low pressure plasma processor for treating a workpiece with an RF plasma wherein the processor includes a low pressure chamber having a workpiece holder for carrying a workpiece adapted to be treated by plasma in the chamber, and the chamber has an inlet for introducing into the chamber a gas which can be converted into the RF plasma for treating the workpiece, the coil being adapted to be positioned outside the chamber to couple an RF field to the gas for exciting the gas to the plasma state, the coil comprising: interior, intermediate and peripheral portions, the interior portion including plural radially and circumferentially extending turns, the exterior portion having at least one circumferentially extending turn, the intermediate portion being configured so it (a) does not include a complete turn, (b) is substantially less than a complete turn, and (c) includes a lead connected to ends of the turns of the interior and exterior portions, the lead having at least a portion that is straight.

52. The coil of claim 51 wherein the interior, intermediate and exterior portions are connected in series, the interior and exterior portions respectively including terminals for connection to a source of RF.

53. The coil of claim 51 wherein the exterior portion includes plural radially and circumferentially extending turns.

54. A low pressure plasma processor for treating a workpiece with a plasma comprising a low pressure chamber where the workpiece is adapted to be located, the

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chamber having an inlet for introducing into the chamber a gas which can be converted into the plasma for treating the workpiece, a coil positioned to couple an RF field to the gas for exciting the gas to the plasma state, the coil including interior, intermediate and peripheral portions, the interior portion including plural radially and circumferentially extending turns, the exterior segment having at least one circumferentially extending turn, the intermediate portion being configured so it (a) does not include a complete turn, (b) is substantially less than a complete turn, and (c) includes a lead connected to ends of the turns of the interior and exterior portions, the lead having at least a portion that is straight.

55. The processor of claim 54 wherein the interior, intermediate and exterior portions are connected in series, the interior and exterior portions respectively including terminals for connection to a source of RF.

56. The processor of claim 54 wherein the exterior portion includes plural radially and circumferentially extending turns.

57. The coil of claim 51 wherein the lead is straight throughout its length.

58. The processor of claim 54 wherein the lead is straight throughout its length.



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**IX. Evidence Appendix**

Exhibit 1: copy of November 15, 1999 office action in Serial Number 08/931503;

Exhibit 2: Declaration of Roger Patrick.

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**X. Related Proceedings Appendix**

None.

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MAY 28 2008

Exh1

Am2

UNITED STATES DEPARTMENT OF COMMERCE  
Patent and Trademark OfficeAddress: COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
08/931,503	09/16/97	HOLLAND	2328-032

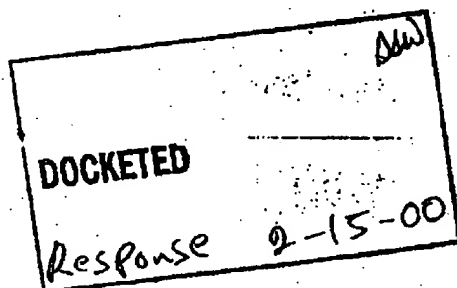
MM42/1115  
LOWE HAUPTMAN GOPSTEIN GILMAN & BERNER, LLP  
1700 DIAGONAL ROAD, SUITE 310  
ALEXANDRIA VA 22314

EXAMINER
BETTENDORF, J

ART UNIT	PAPER NUMBER
2817	

DATE MAILED: 11/15/99

Please find below and/or attached an Office communication concerning this application or proceeding.



Commissioner of Patents and Trademarks

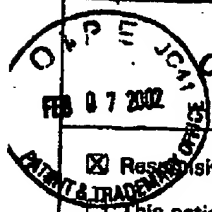
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NOV 15 1999

Lowe, Hauptman, Gopstein &amp; Berner

Related Case

MAY 28 2008



## Office Action Summary

Application No. 08/831,603	Applicant(s) HOLLAND et al.
Examiner Justin P. Bettendorf	Group Art Unit 2817

☒ Responsive to communication(s) filed on Jun 29, 1999☐ This action is FINAL.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

## Disposition of Claims

- ☒ Claim(s) 1-33 is/are pending in the application.
- Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- ☒ Claim(s) 1-33 is/are rejected.
- ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- ☐ Claims \_\_\_\_\_ are subject to restriction or election requirement.

## Application Papers

- ☒ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-848.
- ☒ The drawing(s) filed on Sep 16, 1997 is/are objected to by the Examiner.
- ☐ The proposed drawing correction, filed on \_\_\_\_\_ is ☐ approved ☐ disapproved.
- ☒ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119

- ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- ☐ All ☐ Some\* ☐ None of the CERTIFIED copies of the priority documents have been
- ☐ received.
- ☐ received in Application No. (Series Code/Serial Number) \_\_\_\_\_.
- ☐ received in this national stage application from the International Bureau (PCT Rule 17.2(e)).

\*Certified copies not received: \_\_\_\_\_

- ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

## Attachment(s)

- ☒ Notice of References Cited, PTO-892
- ☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 4
- ☐ Interview Summary, PTO-413
- ☒ Notice of Draftsperson's Patent Drawing Review, PTO-848
- ☐ Notice of Informal Patent Application, PTO-182

— SEE OFFICE ACTION ON THE FOLLOWING PAGES —

U. S. Patent and Trademark Office  
PTO-326 (Rev. 9-95)

Office Action Summary

Part of Paper No. 7

MAY 28 2008

Application/Control Number: 08/931,503

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**DETAILED ACTION***Drawings*

1. The drawings are objected to because figure 2 shows "104" pointing to the same winding as "102" which appears to contradict what is stated in the specification on page 11, line 1.

Correction is required.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: "110" and "140" do not appear to be shown in figure 2 (see page 12). Correction is required.

The applicant is required to provide a copy of the drawings with proposed drawing changes marked in red ink.

*Specification*

3. The disclosure is objected to because of the following informalities: On page 12, line 1 presently reads as "coil 110" which the examiner suggests should be rewritten as --coil 100--, and line 2 presently reads as "112" which the examiner suggests should be rewritten --110-. Also, on page 12, line 31 reads as "120" which the examiner suggests should be changed --130-. On page 15, line 7 presently reads as "portion 10" which the examiner suggests should be rewritten --110-. On page 30, line 5 presently reads as "elements 310 and 312" which the examiner suggests should be rewritten as --elements 312 and 314-. Appropriate correction is required.

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*Claim Objections*

4. The numbering of claims is not accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not).

*pm* Misnumbered claims 18-34 <sup>have</sup> been renumbered 17-33.  
A

*Claim Rejections - 35 USC § 112*

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 and 11 each recite "similar" which renders the claims indefinite because it is not clear what is intended to be encompassed by this term - see MPEP 2173.05(b)C.

Claim 15 recites "the windings" which appears to lack an antecedent basis.

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Renumbered claim 17 (i.e. submitted as claim 18) recites "a pair of adjacent conductor segments ... the adjacent conductor segments forming corners" which appears to be contradicted by "said adjacent conductor segments extending along a first substantially straight line" (i.e. how can the adjacent segments form both a corner and be in a straight line?). Therefore, the claim is rendered vague and indefinite. Claims 26 and 32 each recite "the additional structure" which lacks an antecedent basis.

*Claim Rejections - 35 USC § 102*

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(e) of this title before the invention thereof by the applicant for patent.

8. Claims 1-6, 8-13, and 16 (insofar as can be understood) are rejected under 35 U.S.C. 102(e) as being anticipated by Hama et al. U.S. Patent 5,716,451.

The Hama et al. reference discloses in figure 13 shows a vacuum processor 200 for treating a workpiece L which includes: a chamber 202; a gas inlet 242; and parallel winding coil 214, 216, 212a, 212b with diametrically opposed terminals shown in figure 14. Figure 14 shows a matching circuit 220 and that the coils 214 and 216 have tighter turns (see col. 14, lines 58-68) which increases the magnetic flux density in the center and the peripheral turns 212 which generates a flux greater than the flux generated by the lengths in the intermediate portions

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formed outside of 208a (see ER in figure 16). It should be noted that the claims have been rejected assuming that "similar" means "the same".

9. Claims 1-3, 5, and 16 (insofar as can be understood) are rejected under 35 U.S.C. 102(e) as being anticipated by Gates U.S. Patent 5,731,565.

The Gates reference discloses in figure 6: a vacuum processor with a chamber 10 and workpiece W; a gas inlet as shown; a matching network (see col. 5, line 1). Figure 5 shows a coil 50 with outer peripheral winding 54 and inner central winding 52 with an intermediate portion therebetween. The current inherently develops a magnetic flux density coupled to the plasma greater by the windings 52 and 54 than the connecting portion because there are more windings at the central and peripheral portions in order to yield a uniform plasma (see col. 3, lines 49-52).

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to



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the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hama et al.

As noted above, the Hama et al. reference discloses the connections near the corners (see figure 14) but not "at the corners". Nevertheless, such a modification would have been considered a mere design consideration and therefore would have been considered obvious.

12. Claims 6-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gates in view of Yoshida et al. U.S. Patent 5,690,781.

The Gates reference, as noted above, discloses a plasma processor with an inner coil portion and outer coil portion but does not show two parallel coils.

The Yoshida et al. reference shows in figure 8A a coil for a similar device with parallel coils and diametrically opposed terminations. The parallel coils provides the advantageous benefits of: shorter length of coil for the same plasma density; decrease in electrical resistance; and reduction of unwanted sputtering (col. 5, lines 24-41).

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have substituted an art-recognized equivalent parallel coil in place of the coil in the device of Gates as taught by Yoshida et al. because such a substitution would have

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provided advantageous benefits such as a reduction in unwanted sputtering as suggested by Yoshida et al. thereby suggesting the obvious modification.

With respect to claims 7 and 11-13, it would have been obvious to have formed the coils as rectangular based on the desired substrate to be processed such as a display panel with the terminations formed at the corners which would have been considered a mere design consideration.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Justin Bettendorf whose telephone number is (703) 308-2780 and FAX number is (703) 308-7722.

Justin P. Bettendorf  
Patent Examiner  
Art Unit 2817

jpb  
November 4, 1999

**Attachment for PTO-948 (Rev. 03/01, or earlier)  
6/18/01**

**The below text replaces the pre-printed text under the heading, "Information on How to Effect Drawing Changes," on the back of the PTO-948 (Rev. 03/01, or earlier) form.**

**INFORMATION ON HOW TO EFFECT DRAWING CHANGES**

**1. Correction of Informalities -- 37 CFR 1.85**

New corrected drawings must be filed with the changes incorporated therein. Identifying indicia, if provided, should include the title of the invention, inventor's name, and application number, or docket number (if any) if an application number has not been assigned to the application. If this information is provided, it must be placed on the front of each sheet and centered within the top margin. If corrected drawings are required in a Notice of Allowability (PTOL-37), the new drawings **MUST** be filed within the **THREE MONTH** shortened statutory period set for reply in the Notice of Allowability. Extensions of time may **NOT** be obtained under the provisions of 37 CFR 1.136(a) or (b) for filing the corrected drawings after the mailing of a Notice of Allowability. The drawings should be filed as a separate paper with a transmittal letter addressed to the Official Draftsperson.

**2. Corrections other than Informalities Noted by Draftsperson on form PTO-948.**

All changes to the drawings, other than informalities noted by the Draftsperson, **MUST** be made in the same manner as above except that, normally, a highlighted (preferably red ink) sketch of the changes to be incorporated into the new drawings **MUST** be approved by the examiner before the application will be allowed. No changes will be permitted to be made, other than correction of informalities, unless the examiner has approved the proposed changes.

**Timing of Corrections**

Applicant is required to submit the drawing corrections within the time period set in the attached Office communication. See 37 CFR 1.85(a).

Failure to take corrective action within the set period will result in **ABANDONMENT** of the application.

MAY 28 2008

036/040



Exh. 2

Docket No.: 2328-023RI

PATENT**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of

DUANE C. GATES

U.S. Patent Application No. 09/534,814

Group Art Unit: 3742

Filed: March 22, 2000

Examiner: PASCHALL, Marc

For: SEGMENTED COIL FOR GENERATING PLASMA IN PLASMA PROCESSING  
EQUIPMENT**RECEIVED**Commissioner For Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450JUL 24 2003  
TECHNOLOGY CENTER R3700**DECLARATION OF ROGER PATRICK**

I, ROGER PATRICK, hereby declare as follows:

1. I have been extensively involved in vacuum plasma processor technology since 1984. I am the inventor of patents concerned with coils for exciting plasmas in plasma processors, for example US Patents 5,401,350 and 5,578,165. In addition to being a knowledgeable inventor of many aspects of vacuum plasma processors, I have, since 1986, supervised many people in the field. As a result of the interaction I have had with those in the field, including the supervision I have performed, I am familiar with the level of ordinary skill in the art of those who were working in the plasma processing technology field in 1994. This is particularly true about those who worked on plasma processor coils in 1994, which is about the time I was involved in developing coils of the types disclosed in the '350 and '165 patents.
2. I am currently employed in the plasma processor field by Lam Research Corporation, of Fremont California, the assignee of referenced application. I received a B.A. degree in chemistry and a D.Phil., in physical chemistry from Oxford University, Oxford, England.

**DECLARATION OF ROGER PATRICK**

- 1 -

3. In my opinion, those of ordinary skill in the art in 1994 would have known: (1) the interior portion of the coil illustrated in Figure 4 or 5, inside of circle B of exhibit A, produces magnetic flux having greater density than is produced by the intermediate portion of the coil between the circles A and B of figures 4 and 5 of exhibit A if switch S1 of figure 4 is open and switch S2 of figure 5 is connected to the outer terminal of coil portion 52; (2) the exterior portion of the coil of Figure 4 or 5 beyond circle A produces magnetic flux having greater density than the intermediate portion under the described conditions; (3) the amount of magnetic flux produced by a particular coil arrangement is directly related to the number of turns of the coil arrangement and the amount of current flowing through the coil; (4) when the coils of Figures 4 and 5 are connected as described, the interior, intermediate and exterior portions of the coils are connected in series so that the current which flows from a terminal at the interior of the coil to a terminal at the exterior of the coil has only one path; (5) there might be transmission line effects due to the lengths of the coils between the interior and exterior terminals thereof relative to the wavelength of the RF source; (6) the transmission line effects might cause the current in different parts of the coil to be slightly different from each other; (7) the transmission line effect is not sufficiently great to cause the magnetic flux density in the intermediate portion of the coil to exceed the magnetic flux density in the interior and exterior coil portions; (8) the interior and peripheral portions of the coils of Figures 4 and 5, when connected as previously stated, include plural radially and circumferentially extending turns; (9) the intermediate portion of the coils of Figures 4 and 5, between the interior and peripheral portions thereof, does not include a complete turn and includes a lead having a straight portion; (10) the coils couple RF fields to the plasma; and (11) the coils produce RF magnetic fields, as well as RF electric fields that are coupled from one portion of the coil into the plasma and back to another portion of the coil. My foregoing conclusions are because those of ordinary skill in the art would have learned these basic principles of (3), (4), (5), (6), (8), (9), (10), and (11) in school or other experiences and would have reached the conclusions of (1), (2) and (7) from the principles of (3), (4), (5) and (6).

DECLARATION OF ROGER PATRICK

- 2 -

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine, or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

DATED this 22 day of July, 2003, at Fremont, California

  
\_\_\_\_\_  
ROGER PATRICK

Submitted by:  
Lowe Hauptman Gilman & Berner, LLP  
1700 Diagonal Road, Suite 310  
Alexandria, VA 22314  
Telephone: 703/684-1111  
Facsimile: 703/518-5499

DECLARATION OF ROGER PATRICK

- 3 -

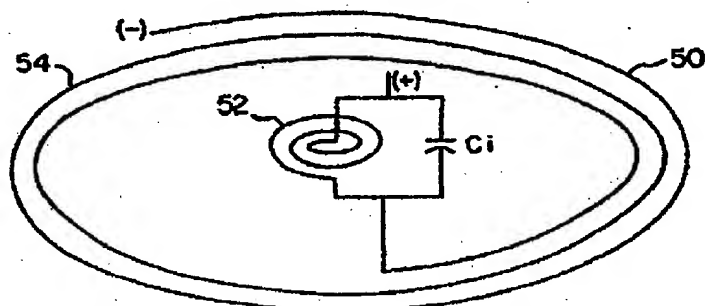


Figure 3

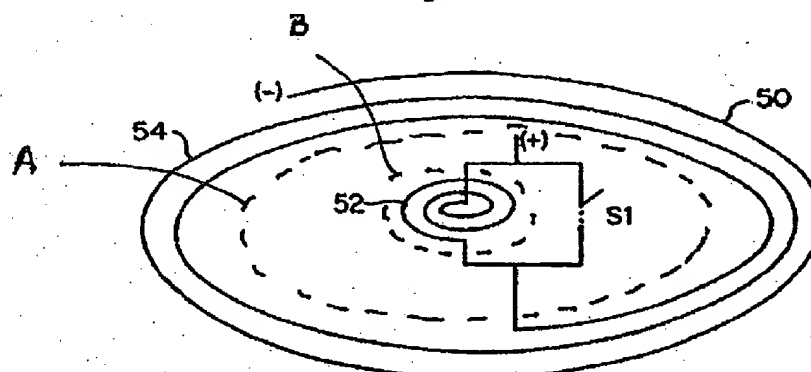


Figure 4

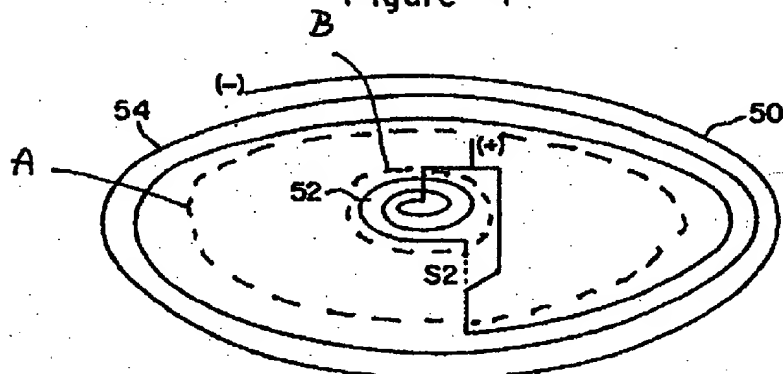


Figure 5

**EXHIBIT A**

Declaration of Roger Patrick  
Serial No.: 09/534,814  
Examiner PASCHALL